

# PATENT ABSTRACTS OF JAPAN

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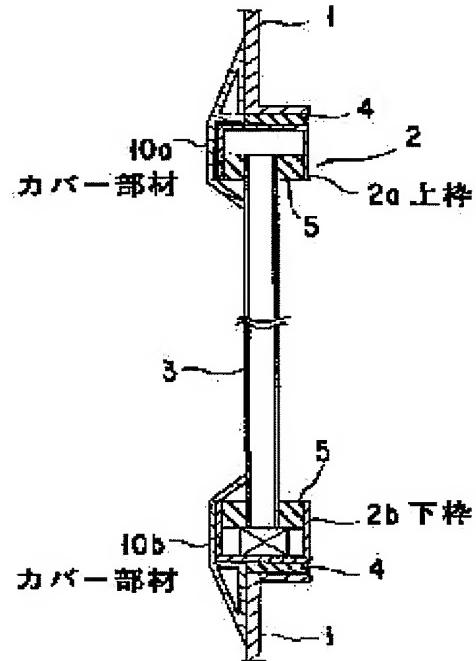
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**(54) ANTIFOULING SURFACE STRUCTURE OF BUILDING AND PANEL USED IN IT**

**(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide an antifouling surface structure of a building capable of effectively preventing the occurrence of a part where water containing dirt is concentrated in a building to cause concentrated adhesion of dirt, and having good antifouling effect and self-cleaning effect.

**SOLUTION:** In this building having a frame 2 fitted to an antifouling wall surface formed by antifouling finished panels 1, an upper frame 2a and a lower frame 2b of the frame are respectively covered with cover members 10a, 10b so that water does not flow to be partially concentrative on the side of the frame, and the upper end edge part of at least the cover member for covering the upper frame is brought into contact with the wall surface, thereby guiding flow of water from the upper part of the frame downward through the cover member. According to another mode, a trough like drip member is provided on the upper end edge part of the upper frame of the frame or the upper end edge parts of the upper frame and the lower frame, or the joint part of the adjacent panels is sealed like a recessed part to drain water by the trough like drip member or the recessed joint part.



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## CLAIMS

## [Claim(s)]

[Claim 1] A stream which leads a flow of water to a lower part or the side from the frame upper part so that water may focus selectively on a flank of the above-mentioned frame and may not flow down to it in a building in which a frame was attached to an antifouling property wall surface — an antifouling property surface structure of a building providing a part or a draining part.

[Claim 2] So that water may focus selectively on a flank of the above-mentioned frame and may not

flow down to it in a building in which a frame was attached to an antifouling property wall surface. An antifouling property surface structure of a building characterized by covering a cope box and a drag

flask of a frame by a cover member, respectively, and a cope box's contacting an upper bed edge of a wrap cover member on a wall surface at least, being transmitted to a cover member from the frame upper part, and making it draw a flow of water caudad.

[Claim 3] So that water may focus selectively on a flank of the above-mentioned frame and may not

flow down to it in a building in which a frame was attached to an antifouling property wall surface. An

antifouling property surface structure of a building providing a gutter-shaped entrance along an upper bed edge of a cope box of a frame, or an upper bed edge of a cope box and a drag flask, and draining

water to the sides with this gutter-shaped entrance.

[Claim 4] So that this wall surface comprises combination of two or more panels, and water may focus selectively on a flank of the above mentioned frame and may not flow down to it in a building in

which a frame was attached to an antifouling property wall surface. An antifouling property surface structure of a building, wherein the seal of the joint part of each adjoining panel is carried out to a concave and it drains water by this concave joint part.

[Claim 5] An antifouling property surface structure of the building according to any one of claims 1 to 4 in which said antifouling property wall surface is characterized by having a hydrophilic material on

the surface.

[Claim 6] An antifouling property surface structure of the building according to claim 5, wherein said

hydrophilic material is the material which has a photocatalyst effect.

[Claim 7] A panel for antifouling property surface structure construction of a building characterized by

comprising the following.

A plate-like panel material with which antifouling processing was performed to the surface.

A frame member attached to a circumference [one side face] peripheral area of this panel material

from the edge at the prescribed distance inside.

[Translation done.]

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the reduction art of dirt, such as the building exterior, in more detail about the panel used for the antifouling property surface structure of a building, and it.

[0002]

[Description of the Prior Art] An exterior building material like a curtain wall, various antifoulingization is considered for the design nature maintenance and reduction of a maintenance cost. For example, it is shown in the patent No. 2756474 that a photocatalyst material demonstrates a self-conservation operation (self-cleaning operation) by the hydrophilic nature. From various paint makers, the hydrophilic antifouling paint for demonstrating a self-conservation operation is also marketed.

[0003]

[Problem(s) to be Solved by the Invention] In the surface treatment which demonstrates an antifouling effect by "hydrophilic nature" of a photocatalyst, a hydrophilic antifouling paint, etc., storm sewage floats the dirt adhering to building material surfaces, and a self-cleaning operation is demonstrated by washing away. However, the part which the water which contained the above-mentioned dirt depending on the structure of a building, such as a wall surface to which the sash frame etc. were attached, concentrates may produce, contamination space may become large, and antifouling property may be unable to be demonstrated. In this case, since other parts are maintaining antifouling property, adhering dirt will be conspicuous.

[0004] When this is explained referring to drawings, the wall surface of buildings, such as a building, performed is incorporated by the joint part sealants 4, such as modified silicone system sealant, and the wall surface is constituted, and "The sash frame object 2 in which the double glazing 3 was inserted via the sealant 5 is attached as shown, for example in drawing 13. Between each panel 1, as shown, for example in drawing 14, it is assembled via the joint part sealant 4 so that it may become the same side mostly. Therefore, the storm sewage containing the dirt which flowed down the panel surface from the upper part of the sash frame object 2. Since it is stopped and collected by the cope box 2a, it flows into the side, it flows down along with the side frames 2c and 2d and dirt focuses on the side corner of drag flask 2b, and its lower part X selectively, compared with other panel parts which demonstrate a self cleaning effect, dirt will be conspicuous. When hydrophilic antifouling processing is performed to the wall surface panel of a multi-story building, etc., in order that the storm sewage which contains a lot of dirt removed by the upper levels in the panel installed in the lower layer part may focus, sufficient self cleaning effect may be unable to be demonstrated.

[0005] Therefore, the part which the water which contained dirt in the building as described above concentrates produces the purpose of this invention. It is in being able to prevent dirt from adhering intensively effectively, having [ are, ], in providing the antifouling property surface structure of the building excellent in the antifouling effect and the self cleaning effect, continuing at a long period of time and maintaining the fine sight of the whole building finely. Furthermore, the purpose of this invention is to provide the panel for antifouling property surface structure construction of the building which can be used conveniently to form such an antifouling property surface structure.

[0006] [Means for Solving the Problem] In order to attain said purpose, according to the first side of this invention, an antifouling property surface structure of a building is provided, and according to the

fundamental mode, a stream which leads a flow of water to a lower part or the side from the frame upper part so that water may focus selectively on a flank of the above-mentioned frame and may not flow down to it in a building in which a frame was attached to an antifouling property wall surface — it is characterized by providing a part or a draining part.

[0007] One mode of an antifouling property surface structure of a building of this invention, a stream to which a flow of water is caudal led from the frame upper part so that water may focus selectively on a flank of the above-mentioned frame and may not flow down to it — providing a part, the more concrete mode. So that water may focus selectively on a flank of the above-mentioned frame and may not flow down to it in a building in which a frame was attached to an antifouling property wall surface. It is characterized by covering a cope box and a drag flask of a frame by a cover member, respectively, and a cope box's contacting an upper bed edge of a wrap cover member on a wall surface at least, being transmitted to a cover member from the frame upper part, and making it draw a flow of water caudal.

[0008] Other modes of an antifouling property surface structure of a building of this invention. Provide a draining part so that water may focus selectively on a flank of the above-mentioned frame and may not flow down to it, and the first mode. In a building in which a frame was attached to an antifouling property wall surface, a gutter-shaped entrance is provided along an upper bed edge of a cope box of a frame, or an upper bed edge of a cope box and a drag flask, and it is characterized by draining water to the side with this gutter-shaped entrance so that water may focus selectively on a flank of the above-mentioned frame and may not flow down to it.

[0009] In the second mode that provides a draining part on the other hand, The seal of the joint part of each adjoining panel is carried out to a concave, and it is characterized by draining water by this concave joint part so that a wall surface of a building comprises combination of two or more panels, and water may focus selectively on a flank of the above-mentioned frame and may not flow down to it. In order to carry out this mode furthermore according to the second side of this invention, for antifouling property surface structure construction of a building consisting of a plate-like panel material with which antifouling processing was performed to the surface, and a frame member attached to a circumference [ one side face ] peripheral area of this panel material from the edge at the prescribed distance inside is also provided.

[0010] As for an antifouling property wall surface (the same may be said of said panel for antifouling property surface structure construction), also in said which mode, it is preferred to have a hydrophilic material on the surface. It is preferred that it is the material which has a photocatalyst effect especially as the above-mentioned hydrophilic material.

[0011]

[Embodiment of the Invention] When it was a part from which water will be supplied, and it will flow and will fall if hydrophilic antifouling processing is performed conventionally, it was thought that a self-cleaning operation could be demonstrated altogether. However, by a part which is stagnated or concentrated and down which water flows, it became clear from various kinds of atmospheric exposure tests that sufficient antifouling performance could not be demonstrated. According to this invention persons research, in such a case, find out that control of the flow of water is important, and pour storm sewage positively. Or even if it is a part which becomes dirty from establishing a stream and a drain path even when the conventional hydrophilic antifouling surface treatment is constructed, it becomes possible to demonstrate a self-cleaning operation, finds out that a fine sight and design maintenance of the whole building are attained, and comes to complete this invention.

[0012] Namely, the stream which leads the flow of water to a lower part or the side from the frame upper part so that water may focus selectively on the flank of the above-mentioned frame and may not flow down the antifouling property surface structure of the building of this invention to it in the building in which the frame was attached to the antifouling property wall surface — it is characterized by providing a part or a draining part. For example, the aluminum panel which performed antifouling processing by photocatalyst membrane, hydrophilic membrane, etc. by hydrophilic antifouling paint or a surface treatment. When building materials, such as an aluminum profile, glass, a tile, and a stone, are used for a wall surface etc. The flow of water is led to the side by making it flow through building material surfaces uniformly, or establishing a stream course and a drain path, without providing a cover member so that unevenness of the cope box of a frame, a drag flask, etc. may be made gently-sloping, and water stagnating and focusing on specific parts, such as a frame both-sides corner.

[0013] Thus, by controlling the flow of water and avoiding partial concentration of the storm sewage containing dirt, it continues at a long period of time, there is also no stagnation of the dirt in a specific part, it is stabilized and the antifouling effect by photocatalyst membrane or hydrophilic membrane and a self cleaning effect can be demonstrated, it can continue at a long period of time, and the fine sight of the building exterior can be maintained. As a building or building materials, all things, such as exterior building materials (a wall surface, a roof, etc.), such as a building and a residence, bathroom structure, Sun Ruehl, a terrace, a balcony, and outdoor home products (an outdoor light, a bench, etc.), are contained, and it is not limited to a specific building or building materials.

[0014] Hereafter, the suitable embodiment of this invention is explained, referring to an accompanying drawing. Drawing 1 and drawing 2 show one embodiment of the antifouling property surface structure of the building concerning this invention. It is incorporated by the joint part sealants 4, such as modified silicone system sealant, and the wall surface is constituted, and each panel 1 in which antifouling processing was performed to the surface. It is the same as that of the above mentioned conventional example that the sash frame object 2 in which the double glazing 3 with which antifouling processing was performed was similarly inserted in the surface via the sealants 5, such as modified silicone system sealant, is attached. In this embodiment, the cover members 10a and 10b are attached so that the cope box 2a and drag flask 2b of the sash frame object 2 may be covered, respectively.

[0015] As each cover members 10a and 10b are clearly shown in drawing 2, the section surface part is carrying out loose trapezoidal shape. As for the surface of the cover members 10a and 10b, it is preferred to be able to consider it as the more gently-sloping shape of a curve (half-elliptical etc.) as well as the antifouling processing panel 1, and to perform antifouling processing to the surface. The upper bed edge of the upper cover member 10a contacts the panel 1, the lower edge section touches the glass 3, and the upper bed edge of the lower cover member 10b contacts the glass 3, and the lower edge section touches the panel 1. Therefore, after the storm sewage containing the dirt which flowed down the panel surface of the sash frame object 2 upper part flows down the cope box 2a as it is on the wrap cover member 10a and washes the glass 3 surface, it flows down drag flask 2b as it is on the wrap cover member 10b. Therefore, like before, it is stopped by the cope box 2a, it is collected, and flows down along with the side frames 2c and 2d, dirt is prevented from focusing on the side corner of drag flask 2b, and its lower part selectively, and a self-cleaning operation of each panel 1 in which antifouling processing was performed, and the glass 3 is demonstrated effectively.

[0016] As a material which has the antifouling operation used for antifouling processing, the material layer which has an antifouling operation of hydrophilic membrane, photocatalyst membrane, etc., especially the material layer which has a photocatalyst effect are used suitably. Although the film containing an inorganic system oxide, especially a silica system oxide is suitably used as hydrophilic membrane, and dirt becomes difficult to adhere and it becomes easy to clean with storm sewage, wash water, etc., by making the surface into hydrophilic nature, it is preferred to use the building material which provided the photocatalyst membrane which disassembles dirt positively especially by a photocatalyst effect. Demonstrating antibacterial properties and a mildew resistant effect with the reactive oxygen species produced under an optical exposure is known, and photocatalyst particulates become possible [it not only being able to reducing the dirt of an exterior building material, but preventing generating of a bacillus or mold].

[0017] As said photocatalyst membrane, it can be conventionally considered as publicly known various photocatalyst membrane. The thin film which consists of the semiconductor itself which shows a photocatalyst effect and the thin film formed only from photocatalyst particulates. To the thin film and pan which are formed from the photocatalyst particulates which support the particles of an antibacterial metal or antibacterial metallic compounds. Various modes, such as a film formed from photocatalyst particulates or the mixture which accepted necessity further, added the particles of an antibacterial metal or antibacterial metallic compounds in the binder of a suitable inorganic system and an organic system or the paint, and was distributed, are included. It may be which structures, such as a continuous thin film, a discontinuous thin film, and an island-shape distribution thin film, and the structure of photocatalyst membrane is not further restricted to a monolayer, and is good also as multilayered construction. It can also be considered as the two-layer structure with an oxidizer or/and an oil repellent agent, or the photocatalyst membrane that the photocatalyst effect

accelerator was made to add or/and support further in the membrane surface in the photocatalyst membrane which consists of material containing a semiconductor particulate or a semiconductor particulate, and a film.

[0018] Although electronic-hole mobility is comparatively large, it is usable in all as a semiconductor which has a photocatalyst effect if it is a semiconductor which has a photocatalyst effect, for example,  $TiO_2$ ,  $SrTiO_3$ ,  $ZnO$ ,  $CdS$ ,  $SnO_2$ , etc. are mentioned.  $TiO_2$  is preferred also especially in these. If an antibacterial metal or antibacterial metallic compounds, such as silver, copper, and zinc, are made to live together with the semiconductor which has such a photocatalyst effect. For example, if use the semiconductor particulate which deposited an antibacterial metal or antibacterial metallic compounds on the surface, or it is made to distribute with a semiconductor particulate in the photocatalyst membrane or is made to adhere to the photocatalyst membrane surface, even if it is at night when light is not irradiated, antibacterial properties and fungus resistance will come to be maintained.

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[0019] As a gestalt of the semiconductor which has a photocatalyst effect, an antibacterial metal, or antibacterial metallic compounds. The gestalt of each particle, the gestalt with which an antibacterial metal or antibacterial metallic compounds have adhered selectively (or some particles may be overall) on the surface of photocatalyst particulates. The gestalt to which minerals binder particles, such as silica, have adhered selectively on the surface of photocatalyst particulates. The minerals binder particles to which the gestalt, the antibacterial metal, or the antibacterial metallic compounds to which minerals binder particles, an antibacterial metal, or antibacterial metallic compounds have adhered selectively on the surface of photocatalyst particulates can adopt various gestalten, such as a gestalt which has adhered on the surface of photocatalyst particulates.

[0020] About 10 nm – 300 nm of about 1 micrometer or less not less than about 5–nm is preferably suitable for the particle diameter of the photocatalyst particulates to be used. If particle diameter becomes smaller than 5 nm, a band gap will become large according to a quantum size effect, and there is a problem that a photocatalyst effect is not obtained unless it is under the lighting which generates short wavelength light, such as a high-pressure mercury-vapor lamp. If particle diameter is too small, handling will also produce the problem that it is difficult or the dispersibility to the inside of a binder worsens. From a point of handling nature, the particle diameter of not less than 10 nm is preferred. Since comparatively big photocatalyst particulates will exist in the building material surface on the other hand when particle diameter exceeds 1 micrometer, also easily, the particles which surface smoothness became scarce and were exposed to the surface drop out. When surface smoothing etc. are taken into consideration, the particle diameter of 300 nm or less is preferred.

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[0021] When forming photocatalyst membrane on the material in which various organic materials and organic coating were formed, so that organic group material (organic coating) may not be invaded by a photocatalyst effect. It is preferred to make the interlayer of not less than about 3.2 micrometers of thickness which consists of material which is not invaded by a photocatalyst effect intervene between organic group material (organic coating) and photocatalyst membrane. As an interlayer who is not invaded by a photocatalyst effect, Silica, alumina, zirconium oxide,  $SiO_2 + MO_x + MO_{x-1}O_5P_2$  ( $MO_xO_5P_2$ ) The thin film of various inorganic materials, such as ceramics, such as at least one sort of metallic oxides, such as  $B_2O_3$ ,  $ZrO_2$ , and  $Ta_2O_5$ , or a nitride, an oxynitride, a sulfide, carbide, and carbon, and metal, can be used conveniently. Or it is not invaded by a photocatalyst effect, the thin film of organic materials, such as silicone resin which is very hard to be invaded, and polytetrafluoroethylene, can also be used. Such materials can be used also as a base (binder) of the distributed paint of photocatalyst particulates.

[0022] Organic matter oxidative degradation capability can be remarkably raised by the synergistic effect of the organic matter oxidative degradation by a photocatalyst effect, and the organic matter oxidative degradation by an oxidizer by making the inside of photocatalyst membrane, or/and the photocatalyst membrane surface add or/and support an oxidizer. As such an oxidizer, for example Chromate salt and chromic acid related compounds, such as  $Na_2CrO_4$ , Oxides, such as metal chloride, such as sulfate, such as nitrates, such as permanganates, such as  $KMnO_4$ , and  $AgNO_3$ , and a nitric acid related compound, and  $CuSO_4$ , and  $FeCl_3$ ,  $CuO$ , and  $Ag_2O$ , etc. are mentioned. On the inside of photocatalyst membrane or/and the photocatalyst membrane surface other than the above-

mentioned oxidizer, as a photocatalyst effect accelerator Au. By making at least one sort of metallic compounds, such as a chloride of metal and metal ions, such as Ag, Pt, Pd, and Cu, and these metal sulfide, and a nitric acid compound, add or/and support, a photocatalyst effect can improve further and contamination can be reduced further. Most of these metal and metallic compounds act also as the antibacterial metal mentioned above or antibacterial metallic compounds.

[0023]The material which has the water repellence or/and oil repellency which are later mentioned in photocatalyst membrane can be added, or it can also apply to the photocatalyst membrane surface, and the chemical compatibility of photocatalyst membrane and oil and fat content can be reduced by it, namely, oil repellency can be improved. This is effective for antisticking of oil and fat content, such as silicone oil which oozes from the modified silicone system sealant used as joint part sealant 4 grade. It is known that the usual photocatalyst membrane will cause the hydrophobilization that the angle of contact of water becomes small under an optical exposure, simultaneously the lipophilic-ized phenomenon in which the angle of contact of various fat and oil components also falls. That is, since the photocatalyst membrane or/and the photocatalyst membrane surface under an optical exposure is excellent in the chemical compatibility not only over water but various fat and oil components, when oil and fat content adheres, it becomes difficult [water entering into the interface of this oil and fat content and photocatalyst membrane, and making oil and fat content emerge]. However, if the inside of photocatalyst membrane or/and the photocatalyst membrane surface are made to add or/and support water repellence or/and an oil repellent agent, oil repelling of the photocatalyst membrane is carried out and chemical compatibility of the photocatalyst membrane surface and oil and fat content is made small. Water enters into the interface of oil and fat content and photocatalyst membrane, it becomes that it is easy to make oil and fat content emerge, and it becomes possible to flush this oil and fat content that emerged easily with water.

[0024]Drawing 3 thru/ or drawing 5 show other embodiments of the antifouling property surface structure of the building concerning this invention, each panel 1 in which said hydrophilic antifouling processing (the followings, such as hydrophilic membrane and photocatalyst membrane, — the same) which was carried out was performed to the surface, although it is the same as that of said embodiment that it is incorporated by the joint part sealants 4, such as modified silicone system sealant, and the wall surface is constituted. Between the cope box 2a of the sash frame object 2 in which it replaced with the cover member and the double glazing 3 with which hydrophilic antifouling processing was performed was inserted in the surface via the sealants 5, such as modified silicone system sealant, and drag flask 2b, and each panel 1, it differs in that the section L shape gutter-shaped drainer members 11a and 11b are attached via the joint part sealant 4, respectively. The attachment mode of the drainer member 11a (11b) of a between [each panel 1] is as being shown in drawing 5, and the joint part sealant 4 intervenes between the drainer member 11a and the upper panel 1. It is preferred to perform hydrophilic antifouling processing also like the surface of the drainer members 11a and 11b.

[0025]The storm sewage which contains the dirt which flowed down the panel surface of the sash frame object 2 upper part in this embodiment, The storm sewage containing the dirt which was collected by the drainer member 11a installed along with the cope box 2a of the frame 2, and flowed down the panel surface of the glass 3 and its flank, It is brought together in the vertical drain (not shown) which were collected by the drainer member 11b installed along with drag flask 2b of the frame 2, and was led to the side, respectively, for example, was installed in the building corner.

Therefore, also in the wall surface structure of this embodiment, dirt is prevented from focusing on the portion of the side corner of the frame 2 selectively like before, and a self-cleaning operation of each panel material 1 with which hydrophilic antifouling processing was performed is demonstrated effectively. Although there may not necessarily be the drainer member 11b installed along with drag flask 2b of the frame 2, it is more desirable to provide, since it will become easy to concentrate dirt on the lower part of the side corner of drag flask 2b selectively if a menstruation fault is carried out for years.

[0026]It is preferred to perform hydrophilic antifouling processing to the side of the above-mentioned drainer members 11a and 11b, and to provide the material layer which has water repellence or/and oil repellency in the undersurface. When this performs hydrophilic surface processing to a part parallel to a ground face like , eave soffit part with the same said of the slant face which faced under the cover members 10a and 10b as shown in said drawing 2. Although it is hydrophilic nature therefore, the

water screen spreads, a drop to the extent that it falls with gravity is not formed, but, as a result, draining of water becomes insufficient, and when the water having contained dirt dries, dirt adheres. When hydrophilic antifouling processing is performed to the part where the wall surface and the eave soffit continued, in order that the water which also contained the dirt of the wall surface section in the eave soffit part may flow in and may stagnate and dry, it becomes easy to produce dirt especially in an eave soffit part. Since a wall surface section demonstrates antifouling property and dirt is not conspicuous, the dirt of an eave soffit part will be emphasized further. In order to demonstrate antifouling property by such a part according to this invention persons' research, It was found out that water repellence or/and the oil repellency are more advantageous, and it was found out that antifouling property can be further demonstrated effectively by the thing as which antifouling property is required and which a hydrophilic operation, water repellence, or/and an oil-repellent operation are used properly, and it compounds, and is used for every part.

[0027]the same — a ground face — abbreviated — a vertical part — and — abbreviated — in the building or building material which has a parallel part, the above-mentioned abbreviation — by providing the material layer which has water repellence or/and oil repellency in the surface (both the undersurface and the upper surface are included) of a parallel part, also in this part, water is easy to be drained, and when the water having contained dirt dries, dirt can be effectively prevented from adhering, receiving a ground face on the other hand — abbreviated — these antifouling effects and self cleaning effects are demonstrated by providing the material which has an antifouling operation, for example, the material which has said hydrophilic operation which was carried out, and a photo catalyst effect, in the surface of the part sloping in the surface of a vertical part, and the slanting upper part. Therefore, by the thing as which antifouling property is required and which a hydrophilic operation and a water-repellent operation are used properly, and it compounds, and is used for every part, it becomes possible to demonstrate antifouling property effectively, and it can continue at a long period of time, and the fine sight of the building exterior can be maintained.

[0028]As a material which has water repellence, although a fluorine-containing siliran compound, silicone, etc. are mentioned, if it can be applied and impregnated, there will be no restriction in particular. Water repellent coating or films, such as polytetrafluoroethylene (Teflon), etc. are applicable. As an example of material of having oil repellency, oil-repellent compounds, such as a fluorine compound and a silicone compound, are mentioned. More specifically Asahi Glass Co., Ltd. make Asahi guard AG-400 series, AG-900 series, AG-600 series, Sumitomo Chemical Co., Ltd. make SUMIRO philharmonic EM series. The product NK guard FGN series made from Japanese Flower Chemicals, Dainik Industries, LTD. make textile guard TG series. There are Dainippon Ink & Chemicals, Inc. make Dick guard F series, NH-10 series, CP series, Sumitomo 3M Scotch whisky guard FG series, Teflon Teflon series by E. I. du Pont de Nemours & Co., etc.

[0029]Drawing 6 and drawing 7 show the antifouling processing panel which can be used conveniently for other embodiments which provide a draining part. This antifouling processing panel 12 consists of the plate-like panel material 13 with which hydrophilic antifouling processing which was described above on the surface was performed, and the frame member 14 attached to the circumference [one side face ] peripheral area of this panel material 13 from the edge at the prescribed distance inside. The numerals 15 are the reinforcing members attached in accordance with the rear-face center line of the panel material 13.

[0030]As shown in drawing 8, the nest of the above-mentioned panel 12 is constructed by inner joint structure so that the joint part sealant 4 may intervene and the concave joint part 16 may be formed between the frame members 14 of the adjoining panel 12. In the antifouling property wall surface structure of this embodiment, the water which flows down the panel 12 surface of a wall surface flows into the concave joint part 16, is twisted this concave joint part 16, and is led to the side and a lower part. Therefore, also in the wall surface structure of this embodiment, dirt is prevented from focusing on the portion of the side corner of a frame selectively like before, and a self-cleaning operation of each panel material with which hydrophilic antifouling processing was performed is demonstrated effectively.

[0031]Drawing 9 shows other examples of composition of the wall surface structure built using the antifouling processing panel 12 shown in said drawing 8. In this wall surface structure, although the lengthwise direction joint part between the upper panels 12 is constituted by straight line shape, the lengthwise direction joint part between the lowermost panels 12 has shifted so that it may be located

in the central part of an upper panel. In the case of such a wall surface structure, it is easy to concentrate the water which contained in the Y section dirt (the oil and fat content which oozes from a joint part sealant is included) in the conventional joint section structure. As a result, since the water which flows down the panel 12 surface flows into the concave joint part 16, is twisted this concave joint part 16, and is led to the side and it is caudad led further again when it constructs using said panel 12 although it is easy to generate dirt. A self-cleaning operation of each panel in which hydrophilic antifouling processing was performed is demonstrated effectively, and generating of partial dirt is prevented.

[0032]As mentioned above, although the suitable embodiment of this invention was explained, this invention is not limited to the above mentioned embodiment, and can be carried out in various modes. For example, a panel-layout gestalt as used the antifouling property panel shown in said drawing 6 and drawing 7 also for construction of the antifouling property wall surface structure shown in the antifouling property wall surface structure and drawing 3, and drawing 4, which are shown in said drawing 1 and drawing 2, and shown in drawing 9 also in this case is employable. When using a cover member, as shown in drawing 2, it is the best gestalt to constitute so that the upper bed edge of the upper cover member 10a contacts the panel 1, a lower edge section contacts the glass 3, and the upper bed edge of the lower cover member 10b may contact the glass 3 and a lower edge section may contact the panel 1, but. When the self-cleaning of a glass surface is unnecessary, it can avoid carrying out antifouling processing of the glass surface, it is also possible to constitute so that the lower edge section of the upper cover member 10a may be kept from contacting the glass 3 (for example, width of the slant surface part which faces caudad is shortened, or it deletes) or the upper bed edge of the lower cover member 10b may not contact the glass 3 further. It is also possible to consider it as next structure in junction between panels.

[0033] [Example] although an example and a comparative example are shown and being explained still more concretely about the effect of this invention hereafter, it comes out that this invention is not what is limited to the following example from the first.

[0034] On the aluminum board (A1100) with a size of 1000 mm × 1000 mm (3 mm in thickness) of the shape shown in sample 1 drawing 11, fluoride paint (DEYUFURON K500 by Nippon Paint Co., Ltd., a color: white) was performed. Subsequently, spray coating of the photocatalyst membrane coating agent by Nippon Soda Co., Ltd. "Bisto RETA NSC-200A" is carried out on this fluoride coating film, Carried out spray coating of the photocatalyst membrane coating agent by Nippon Soda Co., Ltd. "Bisto RETAL and NSC-200C", and heat for 30 minutes, to make it harden at 90 \*\*, to form an interlayer and to harden at 120 \*\* on this further, the photocatalyst layer was formed, and photocatalyst antifouling paint was performed.

[0035] Fluoride paint (DEYUFURON K500 by Nippon Paint Co., Ltd., a color: white) was performed to the panel material surface of the panel made from aluminum of the shape shown in sample 2 drawing 6 and drawing 7 (size of 1000 mm × 1000 mm). Subsequently, spray coating of the photocatalyst membrane coating agent by Nippon Soda Co., Ltd. "Bisto RETA NSC-200A" is carried out on this fluoride coating film, Carried out spray coating of the photocatalyst membrane coating agent by Nippon Soda Co., Ltd. "Bisto RETAL and NSC-200C", and heat for 30 minutes, it was made to heat for 30 minutes, to make it harden at 90 \*\*, to form an interlayer and to harden at 120 \*\* on this further, the photocatalyst layer was formed, and photocatalyst antifouling paint was performed.

[0036] Ishihara Sangyo Kaisha, Ltd. make photocatalyst coating agent ST-K03 was applied to the sample 3 size 800mm×800mm×5mm glass plate, and photocatalyst membrane was formed.

[0037] As shown in sample 1 drawing 1 and drawing 2, the sash incorporating the panel of the sample 1 and the glass plate of the sample 3 has been arranged, and the cover members 10a and 10b which consist of aluminum extruded sections, respectively so that a sash cope box and a drag flask may be covered were further attached between the sash cope box and the drag flask, and the panel.

[0038] As shown in sample 2 drawing 3 and drawing 4, the sash incorporating the panel of the sample 1 and the glass plate of the sample 3 has been arranged, and the drainer members 11a and 11b were further attached along the edge part of a sash cope box and a drag flask, respectively.

[0039] The sash incorporating the panel of the sample 3 sample 2 and the glass plate of the sample 3 has been arranged as shown in drawing 10, and it constructed by inner joint structure as shown in drawing 8.

[0040] The sash incorporating the panel of the comparative example 1 sample 1 and the glass plate of the sample 3 was attached as shown in drawing 10. Said Examples 1 and 2 and the comparative example 1 are the usual joint structures as shown in drawing 14.

[0041] Each panel nest object of the example of examination 1 aforementioned examples 1–3 and the comparative example 1 was set up to the outdoors, and was exposed half a year, color difference deltaE after exposure of each part a–g shown in drawing 10 was measured after that; and the contamination situation was judged. Here, deltaE shows the difference between the hue before exposure, and the hue after exposure, and shows that the contamination situation was so remarkable that this number was large. The measurement result of color difference deltaE is shown in Table 1.

[Table 1]

測定部位	測定No.			比較例1
	1	2	3	
a	1.5	1.4	1.5	1.6
b	1.7	1.4	1.7	5.3
c	1.8	1.4	1.6	1.3
d	1.6	1.4	1.6	1.3
e	1.7	1.4	1.7	5.7
f	1.4	1.4	1.4	1.4
g	1.3	1.3	1.3	1.3

As shown in Table 1, the color difference of the b section of the comparative example 1 and the e section was large, and it has checked that muscle-like dirt had also produced viewing. This is a phenomenon produced in order to collect the storm sewage having contained the dirt of the panel above a sash, to concentrate on a sash both-sides corner and to flow and fall with a sash frame. On the other hand, in Examples 1–3, even if it is which part, the almost same color difference is shown. This reason is as follows.

Example 1: It is because water flowed down the sash and the glass surface uniformly and did not focus on a sash both-sides corner.  
Example 2: It is because the storm sewage which contained dirt by the drainer member was discharged out of the panel.  
Example 3: By using inside joint structure, it is because the water having contained dirt flowed through the inside of an inner masonry joint and did not focus on a sash both-sides corner.

[0043] Each panel nest object of the example of examination 2 aforementioned example 1 and the comparative example 1 was set up to the outdoors, and was exposed half a year, and the visible light transmittance of the glass plate central part exposure before and after exposure was measured. The result is shown in Table 2.

[Table 2]

測定No.	初期透光率 (%)	終期透光率 (%)
実験例 1 初期	95	90
比較例 1 初期	95	78

As shown in Table 2, it turns out that there is little decrement before and behind exposure of the visible light transmittance of the glass plate of Example 1 compared with the comparative example 1. This is the effect that the water from an upside panel surface was uniformly supplied to the glass surface, in Example 1, although the moisture which flows into a glass surface from an upside panel with a sash cope box is intercepted in the comparative example 1.  
[0045] Concentration of dirt can be prevented if it is made to discharge from the panel of Example 1, and the example of glass in the above examination, without centralizing water selectively. As a result,

for that it becomes possible to demonstrate stably the fine sight and design of the building materials which carried out antifouling processing over a long period of time, and reservation of antifouling property, it has checked that it was effective to make it flow down, without centralizing water. It has checked that it became possible to demonstrate stably the fine sight and design of the building materials which prevented concentration of dirt and carried out antifouling processing by extension over a long period of time by establishing a drain path and a stream course intentionally and controlling the flow of water from the example of the panel of Example 2 and Example 3.

[0046] Except making discontinuous joint structure of the lowermost panel and the panel on it, as shown in Example 4 – 6 drawing 9, When the panel nest object was produced like said Examples 1–3 and having been examined like Examples 1–3, the same result as Examples 1–3 was obtained, and it was checked that generating of dirt can be prevented also by such joint structure.

[0047]

[Effect of the Invention] As mentioned above, in order according to the antifouling property panel used for the antifouling property surface structure of the building of this invention, and it to make it flow down uniformly, or to establish a drain path and a stream course intentionally and to control the flow of water, without centralizing water selectively. Dirt can be effectively prevented from the part which the water having contained dirt concentrates producing in a building, and adhering to it intensively, it can be stabilized effectively and the antifouling effect of antifouling property building materials and a self cleaning effect can be demonstrated, it can continue at a long period of time, and the fine sight and design of the building exterior can be maintained finely.

[Translation done.]

## \* NOTICES \*

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.  
2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

**DESCRIPTION OF DRAWINGS**

## [Brief Description of the Drawings]

[Drawing 1]It is an outline partial front view of an example of the antifouling property surface structure of the building concerning this invention.

[Drawing 2]It is an outline fragmentary sectional view of the panel sash joined part of the antifouling property surface structure shown in drawing 1.

[Drawing 3]It is an outline partial front view of other examples of the antifouling property surface structure of the building concerning this invention.

[Drawing 4]It is an outline fragmentary sectional view of the panel sash joined part of the antifouling property surface structure shown in drawing 3.

[Drawing 5]It is an outline fragmentary sectional view of the joined part between panels of the antifouling property surface structure shown in drawing 3.

[Drawing 6]An example of the antifouling property panel used for the antifouling property surface structure of the building concerning this invention is shown, (A) is a front view and (B) is a right side view.

[Drawing 7]It is a VII-VII line sectional view of the antifouling property panel shown in drawing 6.

[Drawing 8]It is a sectional view of the joined part at the time of the nest of the antifouling property panel shown in drawing 6.

[Drawing 9]It is a front view showing other examples of arrangement forms of the antifouling property panel shown in drawing 6.

[Drawing 10]It is a front view of the panel nest object in which the color difference measured region of the example 1 of an examination is shown.

[Drawing 11]The antifouling property panel of the sample 1 used by Examples 1 and 2 and the comparative example 1 is shown, (A) is a front view and (B) is a sectional view.

[Drawing 12]It is an outline partial front view of an example of the antifouling property surface structure of the conventional building.

[Drawing 13]It is an outline fragmentary sectional view of the panel sash joined part of the antifouling property surface structure shown in drawing 12.

[Drawing 14]It is an outline fragmentary sectional view of the joined part between panels of the antifouling property surface structure shown in drawing 12.

## [Description of Notations]

1 and 12 Antifouling processing panel

2 Sash frame object

2a Cope box

2b Drag flask

3 Antifouling processing double glazing

4 Joint part sealant

10a, 10b cover member

11a, 11b drainer member

16 Concave joint part

[Translation done.]